

WHAT IS CLAIMED IS:

Sub  
AI

1. A wavelength selecting module for selecting a light  
signal having a specific wavelength from a plurality of light  
5 signals having different center wavelengths, the plurality of  
light signals being provided as diverging light, the module  
comprising:

a first collimator for collimating the diverging light  
to generate a collimated light beam; and

10 a liquid crystal cell having a predetermined helical  
direction, wherein the liquid crystal cell separates a light  
signal having a specific wavelength among the plurality of  
light signals of the collimated light beam into a left  
circularly polarized light and a right circularly polarized  
15 light, reflects one of the left and right circularly  
polarized light signals that has a same optical rotatory  
direction as the predetermined helical direction toward the  
first collimator in a first state, and passes the plurality  
of light signals of the collimated light beam in a second  
20 state, and wherein the liquid crystal cell changes between  
the first state and the second state in accordance with a  
change in physical energy applied thereto.

2. The wavelength selecting module according to claim  
25 1, wherein the liquid crystal cell includes:

a liquid crystal having a pair of surfaces; and

a pair transparent electrodes which are provided on the  
pair of surfaces and to which a voltage as the physical  
energy is applied.

30

3. The wavelength selecting module according to claim  
1, wherein the liquid crystal is one of a cholesteric liquid  
crystal and a chiral nematic liquid crystal.

4. The wavelength selecting module according to claim 1, wherein the collimator includes:

5 a collimator lens for collimating the diverging light to generate the collimated light beam and converging an optically selected light signal having the specific wavelength reflected by the liquid crystal cell;

10 a first optical fiber for guiding the plurality of light signals to emit the diverging light to the collimator lens; and

a second optical fiber for transmitting the optically selected light signal.

15 5. The wavelength selecting module according to claim 1, further comprising a second collimator for receiving a transmission light beam which pass the liquid crystal cell and conversing the transmission light beam.

20 6. The wavelength selecting module according to claim 5, wherein the second collimator includes:

a collimator for conversing the transmission light beam; and

25 an optical fiber for transmitting the transmission light beam.

7. The wavelength selecting module according to claim 1, wherein the first collimator includes a first collimator unit for causing the collimated light beam to obliquely enter the liquid crystal cell; and

30 a second collimator unit for conversing an optically selected light signal having a specific wavelength reflected by the liquid crystal cell.

Sub  
AI  
end

8. The wavelength selecting module according to claim 5, further comprising a second collimator for conversing a transmission light beam obliquely emitted from the liquid crystal cell.

5

9. The wavelength selecting module according to claim 1, further comprising a first wave plate, located between the liquid crystal cell and the first collimator, for converting the plurality of light signals of the collimated light beam to a plurality of circularly polarized light signals having a same optical rotatory direction as the predetermined helical direction of the liquid crystal.

Sub  
AI  
end

10. The wavelength selecting module according to claim 9, further comprising a second wave plate, arranged opposite to where the first wave plate is provided and facing the liquid crystal cell, for returning the plurality of circularly polarized light signals which have passed the liquid crystal cell to a plurality of non-polarized light signals.

11. A wavelength selecting apparatus for selecting at least one light signal from a plurality of light signals having different center wavelengths the plurality of light signals being provided as diverging light, the apparatus comprising:

a plurality of wavelength selecting modules; and  
a plurality of optical fibers for optically connecting the plurality of wavelength selecting modules, wherein each wavelength selecting module includes,  
a first collimator for collimating the diverging light to generate a collimated light beam, and  
a liquid crystal cell having a predetermined

Sub  
A2  
conf

10  
15  
20  
25  
30

helical direction and receiving the plurality of light signals of the collimated light beam from the first collimator, wherein the liquid crystal cell separates a light signal having an associated wavelength among the plurality of light signals of the collimated light beam into a left circularly polarized light and a right circularly polarized light, reflects one of the left and right circularly polarized light signals that has a same optical rotatory direction as the predetermined helical direction toward the first collimator in a first state, passes the plurality of light signals of the collimated light beam in a second state, and wherein the liquid crystal cell changes between the first state and the second state in accordance with a change in physical energy applied thereto.

15

12. The wavelength selecting apparatus according to claim 11, wherein at least one liquid crystal cell enters the first state by individually changing voltages as physical energy supplied to the liquid crystal cells of the wavelength selecting modules.

20

13. The wavelength selecting apparatus according to claim 11, wherein each wavelength selecting module further includes:

25

a first wave plate, located between the liquid crystal cell and the first collimator, for converting the plurality of light signals of the collimated light beam to a plurality of circularly polarized light signals having a same optical rotatory direction as the predetermined helical direction of the liquid crystal; and

30

a second wave plate, arranged opposite to where the first wave plate is provided and facing the liquid crystal cell, for returning the plurality of circularly polarized

light signals which have passed the liquid crystal cell to a plurality of non-polarized light signals.

Sub  
A2  
cmf  
5 14. A wavelength selecting apparatus for selecting at least one light signal from a plurality of light signals having different center wavelengths, the plurality of light signals being provided as diverging light, the apparatus comprising:

10 a first collimator for collimating the diverging light to generate a collimated light beam; and

a liquid crystal cell unit for receiving the plurality of light signals of the collimated light beam from the first collimator and reflecting at least one light signal toward the first collimator, wherein the liquid crystal cell unit  
15 includes a plurality of stacked liquid crystal cells and wherein each liquid crystal cell includes,

a liquid crystal which has a pair of surfaces and a predetermined helical direction, wherein the liquid crystal separates a light signal having an associated wavelength  
20 among the plurality of light signals of the collimated light beam into a left circularly polarized light and a right circularly polarized light, reflects one of the left and

right circularly polarized light signals that has a same optical rotatory direction as the predetermined helical  
25 direction toward the first collimator in a first state, passes the plurality of light signals of the collimated light beam in a second state, and wherein the liquid crystal changes between the first state and the second state in accordance with a change of a voltage applied thereto, and

30 a pair of transparent electrodes which is provided on the pair of surfaces of the liquid crystal and to which the voltage is applied, wherein at least one liquid crystal enters the first state by individually changing voltages

applied to the liquid crystals via the pairs of transparent electrodes.

15. The wavelength selecting apparatus according to  
5 claim 14, further comprising:

Sub  
try  
cm  
10 a first wave plate, located between the liquid crystal cell unit and the first collimator, for converting the plurality of light signals of the diverging light beam to a plurality of circularly polarized light signals having a same optical rotatory direction as the predetermined helical direction of the liquid crystal; and

15 a second wave plate, arranged opposite to where the first wave plate is provided and facing the liquid crystal cell, for returning the plurality of circularly polarized light signals which have passed the liquid crystal cell to a plurality of non-polarized light signals.

16. The wavelength selecting apparatus according to  
claim 14, wherein the first collimator includes:

20 a collimator lens for collimating the diverging light signal to generate the collimated light beam and conversing an optically selected light signal having a specific wavelength reflected by the liquid crystal cell, and

25 an optical fiber for guiding the plurality of light signals and the optical selection signal; and

the wavelength selecting apparatus further comprises an optical circulator having a first terminal connected to the optical fiber, a second terminal for receiving the diverging light and a third terminal for outputting the optically  
30 selected light signal.

17. The wavelength selecting apparatus according to  
claim 14, further comprising a second collimator for

Sub  
A2  
end

[illegible]